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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/584,137

08/01/2006

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039262-0154

4094

22428 7590 05/20/2008
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EXAMINER

CHEN, KEATH T

ART UNIT

PAPER NUMBER

1792

MAIL DATE

DELIVERY MODE

05/20/2008

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/584,137	Applicant(s) OHMI ET AL.	
	Examiner Keath T. Chen	Art Unit 1792	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12 March 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-11 and 14 is/are pending in the application.
- 4a) Of the above claim(s) 7-11 and 14 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-6 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>06/26/2006</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Election/Restrictions

1. Applicant's election of Group I and Species a, Figures 1 and 2, applicant designates claims 1-6 to species a, in the reply filed on 03/12/2008 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).

Claims 7-11 and 14 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected Group II and Species b-e, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on 03/12/2008.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

2. Claims 1-4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ohmi et al. (US 20030148623, hereafter '623), in view of Kanetsuki et al. (US 20020043341, hereafter '341) and Gigl et al. (US 20050211702, hereafter '702).

'623 teaches some limitations of claim 1:

A plasma processing apparatus (Fig. 3A) comprising a shower plate (#14, [0051], line 8) having a plurality of ejection holes (#14A, [0051], lines 8-9) for ejecting a gas (from inlet #11p, [0052], last 2 lines), a microwave antenna (#20, [0055], lines 1-2) and a cover plate (#15, [0055]) interposed between said shower plate (#14, [0051], line 8) and said microwave antenna (#20, [0055], lines 1-2).

'623 further teaches alumina shower plate (#14 [0051], lines 4-5) and alumina cover plate (#15 [0052]); and the reason of being able to use low thermal conductivity alumina as shower plate is because the use of antenna as cooling for the shower plate ([0034]).

'623 does not teach the other limitations of claim 1:

Said plasma processing apparatus being characterized in that said cover plate is formed by a material which has a relative dielectric constant smaller than that of a material of said shower plate.

'341 is an analogous art in the field of microwave plasma process apparatus (abstract; similar to '623, field of the invention), particularly in solving the showerhead thermal stress induced problems ([0015]; similar to '623's accommodating low thermal

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conductivity material [0034]). '341 teaches thermal stress in showerhead leads to deformation and damage to the showerhead ([0015]).

'702 is an analogous art in the field of microwave sintering (abstract), particularly in providing thermal shock resistant material to reduce fracturing of apparatus (abstract). '702 teaches silicon nitride ([0014]) withstand thermal stress better than alumina ([0013], lines 5-7).

At the time the invention was made, it would have been obvious to a person having ordinary skill in the art to have replaced the cover plate (#15) in Fig. 3A of '623 with silicon nitride, as a material that withstands thermal stress better than alumina, as taught by '702 ([0013], [0014]).

The motivation would have been to reduce the thermal stress of the showerhead, as taught by '341 ([0015]).

The above combination would have had the limitations of:

Claim 2: A plasma processing apparatus according to claim 1, characterized in that the material of said cover plate (it is silicon nitride after replacement) is smaller in the relative dielectric constant and is larger in thermal conductivity (4×10^{-4} , applicant's specification, [0011], line 7) as compared with the material of said shower plate (alumina, 1×10^{-4} , applicant's specification, [0011], line 7).

Claim 3: A plasma processing apparatus according to claim 2, characterized in that the material of said cover plate is smaller in the relative dielectric constant and larger in the thermal conductivity as compared with the material of said shower plate and further has a dielectric loss of 1×10^{-3} or less in microwave (3×10^{-4} , applicant's specification, [0020], lines 6-9).

Claim 4: A plasma processing apparatus according to claim 1, characterized in that the material of said cover plate (#15) contains at least one of silicon nitride (it is silicon nitride after replacement) and quartz and the material of said shower plate (#14) contains alumina ([0051], lines 4-5).

3. Claims 5-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Moslehi (US 6203620, hereafter '620), in view of Sandhu et al. (US 6499425, hereafter '425).

'620 teaches some limitations of claim 5:

A plasma processing apparatus (Fig. 5, for example) comprising a shower plate (#318, col. 13, line 47) having a plurality of ejection holes (#318, col. 13, lines 59-60) for ejecting a gas (from inlets #314, col. 13, lines 58-60), an antenna (#328, col. 13, lines 64-65); and a cover plate (#306, col. 13, lines 63-64) interposed between said shower plate (#318, col. 13, line 47) and said antenna (#328, col. 13, lines 64-65), said plasma processing apparatus characterized in that one of main surfaces (the lower surface) of said cover plate (#306, col. 13, lines 63-64) comprises a plurality of projection-like portions (portion between #316, col. 13, line 58) contacted with said shower plate at

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portions at which no ejection holes are present (as shown in Fig. 5) on one of main surfaces (the upper surface) of said shower plate (#318, col. 13, line 47) and said projection-like portions are each formed by obtuse angles or a curved line (concentric rings, col. 14, lines 66-67), when said one of main surfaces (the lower surface) of said cover plate (#306, col. 13, lines 63-64) is seen from the above.

'620 further teaches an ICP antenna (#328) is coupled to RF (col. 13, line 53).

'620 does not explicitly teaches the other limitations of claim 5:

A microwave antenna.

'425 is an analogous art in the field of PECVD (field of the invention; similar to '620's plasma assisted semiconductor manufacturing, field of the invention), particularly in using power sources to inductively affect gas (col. 5, lines 35-37; similar to '620's ICP). '425 teaches using microwave source (Fig. 5B, #404, col. 7, lines 62-63) instead of RF power source (col. 7, lines 59-60) to affect gas (col. 5, lines 35-37).

At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to have replaced RF ICP to the antenna (#328) in Fig. 5 of '620 by a microwave source, as taught by '425.

The motivation would have been suitability. The selection of something based on its known suitability for its intended use has been held to support a *prima facie* case of

obviousness. *Sinclair & Carroll Co. v. Interchemical Corp.*, U.S. 327, 65 USPQ 297 (1945).

'620 further teaches the limitation of claim 6:

A plasma processing apparatus according to claim 5, characterized in that said projection-like portions each form a circle (concentric rings, col. 14, lines 66-67, are circles) when said one of main surfaces of said cover plate is seen from the above.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. US 2003/0200929 is cited for alumina being more resistant to plasma than quartz.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Keath T. Chen whose telephone number is 571-270-1870. The examiner can normally be reached on M-F, 8:30-5:00 EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Cleveland can be reached on 571-272-1418. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/K. T. C./
Examiner, Art Unit 1792

/Michael Cleveland/
Supervisory Patent Examiner, Art Unit 1792